CONFIDENTIAL

MEMORANDUM FOR: Director of Central Intelligence

SUBJECT: Comments on Position Paper of National Science Foundation dated 6 December 1957

REFERENCE: AD/SI Memorandum, subject: Space Travel and Reconnaissance Satellites dated 25 November 1957

1. This memorandum is for information only.

2. Reference contains my essential comments, some of which, however, I will repeat. I believe that the U. S. effort in space vehicles, including research, exploration and possible utilization as instruments of war, belongs in the Defense Department. I likewise believe that the present military structure could well slow down the entire program. Some manageable organization, headed up at an Assistant Secretary of Defense level, must be worked out within the Defense Department if the responsibility is allocated there and the work is to be aggressively and efficiently pursued. This organization must have funds for the program and the authority necessary to conduct research on its own and to insure that the services supply the necessary supporting research and equipment for the program. Neither the National Science Foundation or National Advisory Committee for Aeronautics can conduct a program with the scope and vigor required.

25X1

[redacted]

HERBERT SCOVILLE, JR.
Assistant Director
Scientific Intelligence

On file NSF release instructions apply.

cc: DDCI
DD/I
SA/P/DCI

EXECUTIVE REGISTRY FILE National Science Foundation

CONFIDENTIAL

ER 9 - 9570

20 December 1957

MEMORANDUM FOR: Director of Central Intelligence

SUBJECT : Comments on Position Paper of National Science Foundation Dated 6 December 1957

REFERENCE : AD/SI Memorandum on the Above Subject Presented Herewith (ER 9 - 9506)

1. This memorandum is for your information only. The AD/SI comments on only one facet of the National Science Foundation proposal. Regardless of the merit of Dr. Scoville's view that the US effort in space vehicles belongs in the Defense Department, it seems to me that all the recommendations of the National Science Foundation paper are worthy of support. On the question of organization, the recommendation is that Killian and his Scientific Advisory Board should study the problem of organization and make a recommendation. This seems to me an eminently desirable first step in mapping a program, and I wonder if the AD/SI could not be brought to concur in this view.

2. Having said this much, and having discussed his earlier paper on this matter with the AD/SI, I must state that on further reflection I disagree more strongly than ever with his position concerning the location of these responsibilities in the Pentagon. On the other hand, I agree strongly that if the responsibility is to be located there it should be handled within the Pentagon in the manner he recommends.

3. Briefly, my views about Defense Department sponsorship of space programs and activities are as follows:

A. I am aware of the grave difficulty in the way of setting up a new civilian agency to administer space programs separate from the missile programs of the Pentagon. Such a new (or existing) civilian agency would compete for talent, funds, and other resources.

It would probably come off second best in this competition (at least to begin with) yet its activities would be regarded as a dilution of military programs. These are formidable, practical objections, but I would argue very strongly that the example of the Manhattan project and the Atomic Energy Commission demonstrates that they can be overcome.

B. The disadvantages of exclusive, or even primary, sponsorship and control of these activities by the Defense Department over the long run seem to me, however, even more horrendous. First, an excessive preoccupation with more or less immediate military applications could expose us to the risk of again being leapfrogged by an earlier and heavier Russian investment in space activities. Second, this promises to be a large and expanding field of activity, and I believe we have had many recent demonstrations that the top management of the Defense Department is already grossly overloaded and is far from adequate to the handling of the present business. My fear is that a "space department" inside the Pentagon will lack even that degree of independent authority that it might have as a separate organization. Third, I believe we will pay a high price in terms of world opinion and attitudes if we put a military label on one of the most dramatic and rapidly expanding fields of scientific endeavor. Fourth and final, we already have far too much of our own scientific community working under military auspices and in the pay of the military departments. I am literally horrified at the notion that this military orientation and ultimate control of great sectors of scientific investigation should be greatly extended. We are in danger of making the whole progress of science a by-product of the armaments race instead of developing advanced weapons systems as a by-product of scientific progress. To my mind, it is difficult to foresee the affect on our whole culture of such a perverse subordination.

C. The two opposing sets of considerations I have set forth above lead me to conclude that there are major short-run practical difficulties in the way of establishing at this time an independent civilian space program but that over the long run there are vastly greater disadvantages to leaving the control of these activities in

the Defense Department. I would, therefore, set as an objective to be attained within a year or two the establishment of a new, independent, civilian organization, modelled somewhat on the AEC as to its functions (though not necessarily as to its structure). As a first step, however, the new agency might be established within the Department of Defense, to remain there while working out the techniques for carrying forward an advanced program of space exploration in close cooperation with the narrower and shorter-run military missile programs of the Services. Whether or not such an evolutionary course of action is possible, someone must start very soon to develop programs which will be separate from those of the military Services. If the line of separation can be drawn within the Pentagon, I feel it can be drawn between the Pentagon and an independent organization. The latter will have a better chance of survival, however, if it comes into existence by being split off from the Defense Department rather than as an entirely new entity.

25X1 [redacted]

RICHARD M. BISSELL, JR.
Special Assistant to the Director
for Planning

Attachment
ER 9 - 9506

cc: DDCI w/o att
DD/I w/o att
AD/SI w/o att

CONFIDENTIAL

NATIONAL SCIENCE FOUNDATION
Office of the Director
Washington 25, D. C.

December 6, 1957

POSITION PAPER

A National Effort in Space Exploration and Research -- Objectives, Activities and Organization --

The most fundamental reason for U.S. consideration of scientific space exploration is a general one. In the satellite programs of the International Geophysical Year, man has now not only conceived the idea but has demonstrated his capability to embark upon a practical, feasible undertaking in the exploration of outer space. For the first time in his history he is enabled to begin a systematic and intimate study of the world completely outside his natural habitat. This study will necessarily be costly in money and effort, and will be fraught with danger. But it should be abundantly clear that such considerations will not discourage mankind from continuous and determined attempts to explore this new realm and capitalize upon his findings. While we may speculate upon what we may find and exploit at this stage, we should understand that this can merely be speculation. What is essential, however, is a realization of the impressive scope of this whole undertaking. Where this new frontier may lead lies beyond our imagination. Our wisest step at the moment is to begin with a systematic study, scientific in character, of the findings that may be made from this new vantage point and the techniques by which we can secure these findings.

*** *** * *** ***

A. Basic Policy Question: Is a national effort in space exploration and research, over and above the effort required in connection with military missiles, essential to the national interest, and if so what is its relative priority in relation to other research and development programs?

Alternatives:

1. Cessation of federally-supported non-military programs of space research following the termination of the International Geophysical Year.

2. Establishment of a cooperative program among countries (with or without the USSR and other Iron Curtain countries).

3. Establishment of a strictly U.S. program on a permanent basis and of a scope and magnitude sufficient to take proper advantage of the unique opportunities now opened up and sufficient to keep pace with other nations.

In behlaf of alternative #1, it could be argued that space research of a fundamental character carried on by the military agencies to support missile, reconnaissance satellite, space platform and other strictly military undertakings would provide as much or more information about outer space as a continuation of space research under other auspices. It can also be argued that financial resources of the Government will be strained to the utmost to accommodate research, development and hardware procurement of military items such as missiles, reconnaissance satellites, etc., and that little room is afforded for additional large programs. On the other hand, even stronger arguments can be advanced, particularly in terms of U.S. and world public opinion, in favor of a strictly scientific, civilian-managed program which could not be suspected of military purposes.

Alternative #2 would ideally make possible the achievement of cooperation for a "world plan" for space exploration and research. It would also tend to de-emphasize US-USSR military competition in this field and, consequently, might tend to reduce US-USSR tensions. However, at present, it would appear that alternative #2 is feasible as related to the countries of the free world. Cooperation with the USSR might be achieved but only after success in reaching agreements with the USSR for control of space vehicles.

With respect to the third possible course of action, it is apparent that the cost in dollars would eventually be high. It is also clear that the effort would compete with missile programs for the requisite scientists and engineers, although a great deal of scientific competence not presently involved in missile programs would be drawn in. Therefore, it must be asked: What national needs are at stake here which could not be met, at least in large measure, as by-products of military research and development activities incident to the missile and other programs?

(1) A new and unique frontier for exploration by man extending far beyond military considerations -- a frontier which the U.S. cannot afford to neglect.

(2) U.S. and world opinion mentioned above.

(3) Possible new developments of great practical importance. For example, (a) revolutionizing of weather forecasting through use of weather patrol satellites; (b) improvement in global communications systems through possible use of satellite relay stations.

Even the inception of such a program would carry important by-products, such as the stimulation of science and scientific education. However, it would be a grievous error to base a decision on whether or not to proceed with a space exploration and research program upon any attempted "costing" of a "list" of likely results. It is not realistic to sit back and wait for the practical utility of space research to be proven because specific applications cannot be foreseen. The process must start somewhere and an initial "down payment" made.

Conclusion:

A U.S. scientific program of space exploration and research should be initiated without delay. Such a program would have an inestimable advantage for science, but its effects would extend far beyond the purely scientific or the strictly military.

B. Objectives:

1. To perform, or support the performance of space research of a fundamental character, including inquiries, such as:

a. Properties of the upper atmosphere and beyond.

b. Nature and intensity of electromagnetic and corpuscular radiations from the sun.

c. Electric, magnetic and gravitational fields within the solar system.

d. Study of cosmic rays.

e. Character and distribution of matter in space.

f. Study of astronomical phenomena "in the clear".

g. Biological processes as affected by conditions in outer space.

2. To perform, or support the performance of applied research directed toward the useful practical applications in whatever fields appear promising, including weather forecasting, agriculture, medicine and communications.

3. To develop, or support the development of, such vehicles, stations or other facilities in outer space as are feasible and desirable, from the standpoint either of further research or for practical civilian use.

4. To conduct the above activities so as to obtain (a) maximum contribution to scientific knowledge; (b) maximum contribution to practical applications; (c) maximum favorable impact upon other countries; while (d) at the same time

affording all possible benefit to military progress and national security.

C. Organization - Bearing in mind that a major part of the program should be carried out through contractual arrangements, the following alternatives present themselves:

1. Within the Defense Establishment

a. Assignment of operational responsibility for particular phases of the program to the appropriate military services.

b. Creation of a Space Exploration and Research Department, Administration or other organization, on an atonomous basis within the Department of Defense, to be headed by a civilian Secretary or Administrator reporting directly to the Secretary of Defense.

2. Within an Existing Civilian Agency

a. Assignment of the program to the NACA, at the same time giving that agency precise authority to include space research as well as aeronautics in its program.

b. Assignment of the program to the National Science Foundation.

3. Creation of a new agency of Government to develop and carry out the program

With regard to alternative #1, the new program has obvious military implications and could be justified in terms of departmental interests just as relevant basic research is presently justified. However, if the program were placed in the Department of Defense, all activities and expenditures would have to be thus justified, i.e., in military terms. The vast new horizons, stretching far beyond the purely military, which will be opened up by progress in this area of scientific activity are of concern to all segments of the national community and their exploitation obviously should not be confined to

the military. Also to be considered is the differing impact upon world opinion of military-led vs. civilian-led programs. In this connection, the Soviets are able to associate their scientific programs with the military and "keep it quiet"; we cannot.

With respect to alternative #2, while offering the advantages of civilian administration in terms of impact upon world opinion, it is not clear that either agency could accommodate the new program on a permanent basis and do justice both to existing missions and the tremendous additional effort required. The new program would probably be of such size as to seriously unbalance either of these two agencies.

It would seem likely, on balance, that, because of the newness and magnitude of the effort, the establishment of a new organization within the Government will ultimately be required. Initially at least, the necessary equipment, facilities and logistic support would have to be provided by cooperation of the military establishments. In any event, the establishment of a new organization would require a great deal of preparation, including initial study of the problems involved, new legislation, appropriations, and formation of an operating structure. However, the organization should be under way not later than the termination of major IGY activities in January 1959. Consequently, the initial planning must be started with a minimum of delay.

D. Recommendations:

1. A U.S. program of space exploration and research should be initiated without delay.

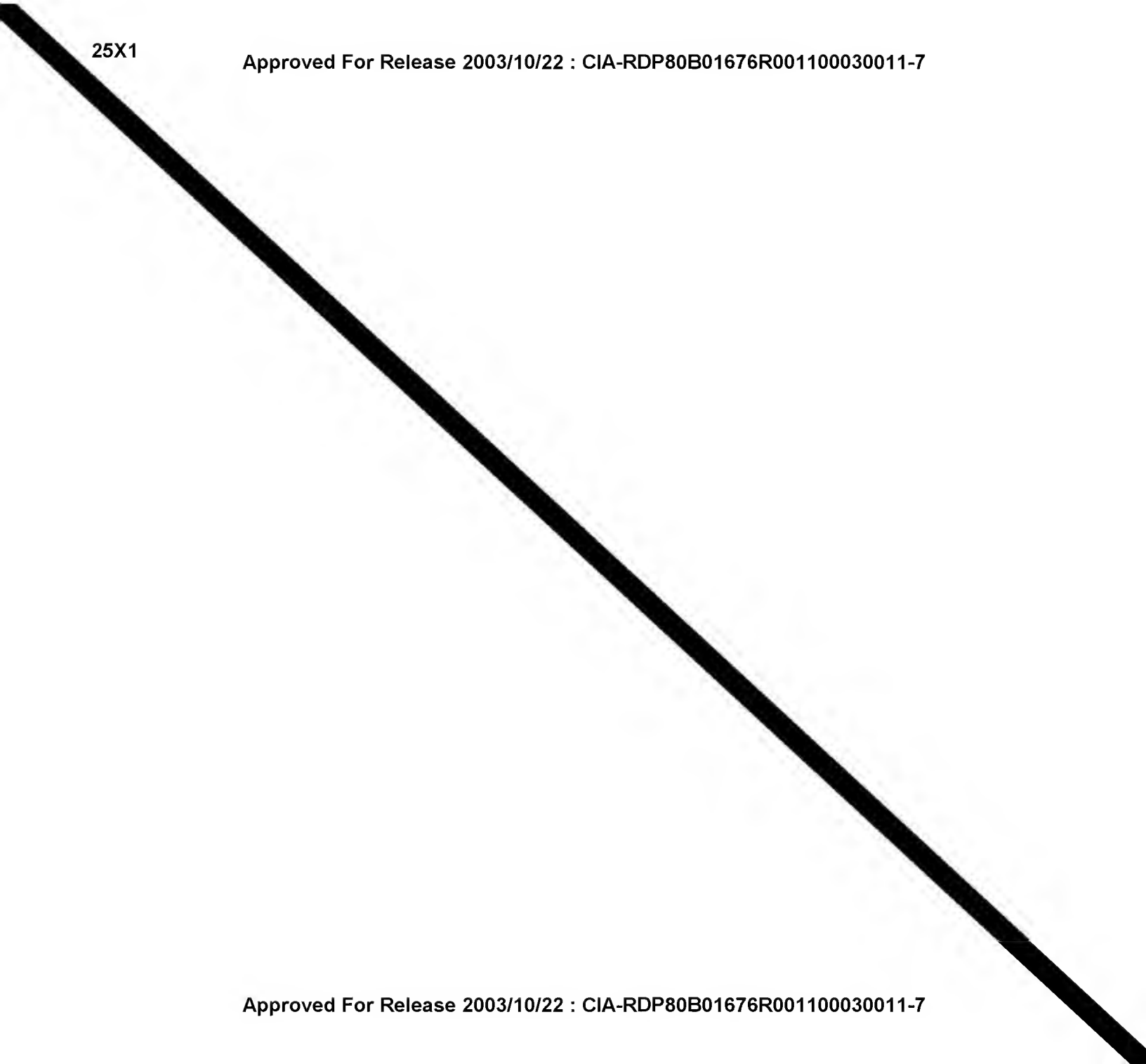
2. Due to the nature, magnitude and complexity of such a program, decisions regarding the organization, funding level and legislation required should have the immediate benefit of the most competent advice that can be assembled.

3. As a first step, it is recommended that the President appoint, or request the Special Assistant to the President for Science and Technology or the National Science Board, under its present statutory authority, to appoint a Special

Commission to investigate the problem and to recommend to the President the best method of organization in the Federal Government to push such work with the greatest despatch. The Commission should also estimate the general level of funds required for the first few years. In any event, the National Science Foundation could provide for the Secretariat and the operating expenses of the Commission (as it has done, for example, for the President's Committee on Scientists and Engineers).

In formulating its recommendations, the Commission should obtain the views of the National Academy of Sciences, interested private scientific and professional societies, the Department of Defense, National Advisory Committee for Aeronautics, National Science Foundation, Atomic Energy Commission, and other public and private organizations.

4. As an interim measure, the National Science Foundation should be requested to support such space research and such studies at the present time as can be accomplished in addition to the military and IGY efforts and thus to carry on appropriately in this field until a permanent structure for this purpose is in being, in full cooperation with the Department of Defense, National Academy of Sciences, National Advisory Committee for Aeronautics, and other appropriate bodies.



Approved For Release 2003/10/22 : CIA-RDP80B01676R001100030011-7

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25 NOV 1957

Dr. Alan T. Waterman
Director
National Science Foundation
Washington 25, D. C.

Dear Alan:

I appreciate very much your having forwarded me the copy of your letter to Mr. McElroy relative to the organization for research on space travel. This agency has considerable interest in this subject and is glad to keep abreast of all proposals in this field. We are also formulating our views on programs in this field, and your views will be of assistance to us in arriving at our position. I should be glad to discuss these with you when they are further crystallized.

Sincerely,

Signed

Allen W. Dulles
Director

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CONCURRENCES:

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AD/Scientific Intelligence

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9-8686

NATIONAL SCIENCE FOUNDATION
OFFICE OF THE DIRECTOR
WASHINGTON 25, D. C.

November 19, 1957

CONFIDENTIAL

CONFIDENTIAL

The Honorable Allen W. Dulles
Director, Central Intelligence Agency
Washington 25, D. C.

Dear Allen:

By the enclosed copy of my letter to Secretary McElroy, I am bringing to your attention a matter which seems to me of very considerable importance and immediacy. It is abundantly clear that the country is anxiously awaiting word as to the intentions or plans of the Government to proceed with a program in the exploration of space.

Apart from the point of view I have taken in this letter to Mr. McElroy, I believe it is most important and urgent that this question receive prompt consideration by the interested agencies of Government. This includes at least the Department of State the Department of Defense, the Central Intelligence Agency and the National Science Foundation.

This matter has been discussed in a preliminary way with Dr. James R. Killian, Jr.

Sincerely yours,

Alan

Alan T. Waterman
Director

Enclosure

(Unclassified upon removal of enclosure)

CONFIDENTIAL

NATIONAL SCIENCE FOUNDATION
OFFICE OF THE DIRECTOR
WASHINGTON 25, D. C.

November 15, 1957

CONFIDENTIAL

The Honorable Neil H. McElroy
Secretary of Defense
Washington 25, D. C.

Dear Mr. McElroy:

I am taking this occasion to write you concerning future plans for a United States satellite effort--this matter of obvious present urgency. Insofar as such effort may take the form of a scientific undertaking, the National Science Foundation and its National Science Board are involved by responsibilities assigned in the National Science Foundation Act of 1950 and Executive Order 10521 of 1954.

We are pleased with your announcement that the Army will go forward with its project to back up Project Vanguard. It is my understanding that the Army project is intended to supplement Vanguard as an undertaking for the International Geophysical Year. In this connection, of course, it is clear that careful coordination should exist both between the two projects and with the United States National Committee for the International Geophysical Year (under the National Academy of Sciences-National Research Council) which has cognizance of the scientific programs of the International Geophysical Year, including the satellite project in the latter, subject of course to limitations of payload and feasibility set by the Department of Defense.

With regard to the future of the U. S. plans regarding space exploration, looked at objectively there seem to be only three possibilities as follows:

A. Stop the U. S. program after the International Geophysical Year

B. Consider possible international (or Free World) collaboration.

C. A determined program to match Russia's challenge.

Possibility A. seems completely out of the question; this is not a field we can now ignore in view of the opinion of our own country and of the world. Possibility B. would be very difficult of execution, even if we should like to do so, especially since we would be leading from weakness. Its only asset might be a movement toward peaceful cooperation somewhat like the Atoms for Peace plan.

It seems to me that we have no alternative but plan C. (a halfhearted effort will not do). In that case, there is certainly no question that a really determined effort must be made on the highest priority basis. This will be very expensive and unfortunately will necessarily draw skilled manpower to some extent from the military programs, even if only part-time. However, it is quite likely that we have on tap manpower resources which can be turned to this purpose and also likely that such an independent effort along these lines may provide fresh ideas which could be useful to the military.

Such an effort unquestionably requires a special organization, with a strong director. I believe there are strong reasons for setting up such an organization outside the Department of Defense. This is no reflection upon the competence of the Department of Defense, either in this area or in accomplishment of high priority programs. The primary reason is that in view of the Russian approach, which emphasizes science and space travel, there will be a very unfavorable attitude throughout the world if the U. S. program were known to be associated with the military. (The Russians can do this and keep it quiet; we cannot) Besides, it is of great importance that this be known to be a civilian scientific undertaking, in order to have the enthusiastic and wholehearted cooperation of scientists and the public generally.

This is one program which, in my opinion, warrants a Manhattan project type of organization. An effective set-up requires careful consideration, but the central idea should be the establishment of a center financed by the Government by contract with a civilian agency, in order to provide sufficient flexibility. Such an organization should have the full cooperation of the Department of Defense. It should also have authority to conduct or subcontract such research and engineering as needed. Possible goals can readily be outlined and should have to be considered with care. The announced purpose should be scientific exploration of the earth's environment and outer space.

Such a set-up would also have the advantage of serving to deflect attention from Defense projects of similar or related character but with military goals and also to protect security classification aspects of the latter.

Interested agencies which could unite in its support would be the National Science Foundation, the National Academy of Sciences-National Research Council, and the American Rocket Society, together with scientific societies such as the American Geophysical Union and others with particular related interest.

I should be happy to discuss this matter with you at your convenience as would Dr. Bronk, President of the National Academy of Sciences.

Sincerely yours,

Alan T. Waterman
Director

9-8597/4

NOV 1957

Mr. Robert C. Truax
President
American Rocket Society, Inc.
500 Fifth Avenue
New York 36, New York

Dear Mr. Truax:

Your letter and enclosed report have been studied with considerable interest. Your thoughtfulness in considering the Agency's possible interest in your proposal is greatly appreciated.

Although I cannot comment directly on the specific recommendations contained in your letter, the views of such a highly qualified group on a subject of such current national importance are always welcome. I can assure you that personnel in my organization are cognizant of and very much concerned with the potential importance of future developments in the field of astronautics. We shall keep your ideas in mind in our discussion on future programs in this field.

Sincerely,

Allen W. Dulles
Director

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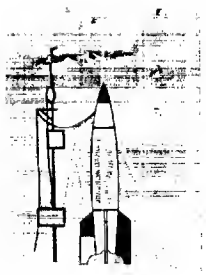


American Rocket Society, Inc.

500 Fifth Avenue, New York 36, New York PEnnsylvania 6-6845

NOV 12 1957

Mr. Allen W. Dulles
Director, Central Intelligence Agency
2430 East St., N. W.
Washington, D. C.

Dear Mr. Dulles:

The American Rocket Society transmitted the enclosed report to the President on October 17, 1957. This report is the result of a long study by our Space Flight Committee, which is composed of a large number of the best qualified men on all fields related to space flight. The report has been reviewed and approved by the Board of Directors of our Society after intensive deliberation. We feel it represents the most informed opinion on the subject available.

The primary recommendations of the report are these:

(1) The foreseeable utility of space vehicles is sufficient to justify a continuing federally sponsored program of considerable magnitude.

(2) In view of the many uses of space vehicles other than the purely military variety (such as surface to surface ballistic missiles), control of this agency should not be vested exclusively in the Defense Department.

(3) A new agency having status comparable to the Atomic Energy Commission or the National Advisory Committee for Aeronautics should be created to plan and manage the Space Flight Development Program. The Departments of State, Defense and Commerce, the Central Intelligence Agency, the scientific community and the general public should be represented on the steering committee for this agency.

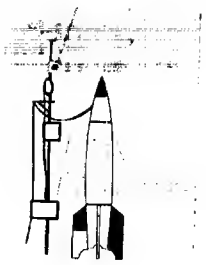
(4) The mission of this agency should be a broad one to permit farsighted planning and should include all but strictly military applications.

The report has been referred to the Scientific Advisory Council of the O.C.B. We are somewhat concerned that the problem

may be regarded as exclusively scientific, whereas in fact, many short term utilities are not in the realm of "science" at all. We would like to suggest that, if the CIA has an interest in the matter, its views be communicated to whomever will make the final decision. We feel that the approach to the problem suggested by our society may be particularly acceptable to your agency.

Yours very truly,

ROBERT C. TRUAX
President



American Rocket Society, Inc.

500 Fifth Avenue, New York 36, New York PEnnsylvania 6-6845

October 17th, 1957

The President
The White House
Washington, D. C.

Dear Mr. President:

The enclosed report of the Space Flight Committee of the American Rocket Society is respectfully submitted for your attention.

It documents the need for a continuous national Space Flight Program, and for an organization to carry it out. Also enclosed is information regarding the American Rocket Society, from which our competency to make such a recommendation may be judged.

These recommendations in no way represent a stopgap answer to the satellite of the USSR. Indeed the report was drafted prior to the Russian announcement. We do feel, however, that the recommendations represent a course of action, which, if carried out, will insure the eventual superiority of the United States in this new field. Our Society feels that any less forthright action will not be adequate to overtake the Russian lead.

Although this report is of an unclassified nature, it has been prepared by individuals having full access to all necessary information in their daily work on the nation's guided missile program. The report is rendered in full awareness of the current state-of-the-art. We earnestly request your consideration of the ideas outlined.

Our Society represents a direct channel to the best qualified talent in this country in the missile and space flight field. We are pleased to offer our further services in any manner that might be helpful. In particular we would like to discuss further, with you or whomever you designate, the specific proposal advanced in this report.

Respectfully yours,

Robert C. Truax

ROBERT C. TRUAX
President
American Rocket Society

THE AMERICAN ROCKET SOCIETY

The American Rocket Society is a professional organization of more than six thousand engineers and scientists, formed over twenty-seven years ago to to foster the development of space flight, rocket propulsion, and related technology.

Since 1952 the Society has had a permanent Space Flight Committee, which is charged with appraising the technical, politacal, economic, and social aspects of flight beyond the atmosphere. A report of this Committee, submitted to the National Science Foundation in 1955, was instrumental in the initiation of the Vanguard Satellite Project.

The Board of Directors, the governing body of the American Rocket Society, is currently composed of the following individuals.

ROBERT C. TRUAX - President and Chairman of the Board.
Commander, U.S. Navy. Twenty years experience in rockets and missiles. Former Head, Surface Launched Missile Branch, BuAer., Navy Dept. Currently Deputy Director Weapon System 117L. On duty at the Ballistic Missile Div. USAF by special request of the Assistant Secretary of the Air Force for Research and Development.

GEORGE P. SUTTON - Vice President
Chief Preliminary Design, Rocketdyne Div., North American Aviation, Inc. Author of text "Rocket Propulsion Elements". Sixteen years of rocket and missile experience.

KRAFFT EHRICKE - Director
Chief of Preliminary Design, Convair-Astronautics. Formerly with V-2 Development Group, Peenemunde. Eighteen years rocket experience.

ANDREW G. HALEY - Director
Attorney-at-Law, Washington, D.C. President, International Astronautical Federation. Former President, Aerojet Engineering Corp. Fifteen years experience in rocket and missile management.

S. K. HOFFMAN - Director
General Manager, Rocketdyne Div., North American Aviation, Inc. Former Professor of Aeronautical Engineering, Penn. State. Former Chief Engineer Lycoming Div., Aviation Corp. Eight years rocket and missile experience.

H. W. RITCHEY - Director
Technical Director, Rocket Division, Thiokol Chemical Corporation. Eight years experience in rocket field.

MILTON ROSEN - Director
Eleven years experience in ballistic rockets. Director of Viking Project. Director Vanguard Vehicle Project. Head, Rocket Development Branch, Naval Research Lab.

HOWARD S. SEIFERT - Director
Fifteen years in rocketry Formerly Head of Liquid Rocket Development, Jet Propulsion Lab., Cal. Tech. Currently Senior Staff member, Guided Missile Research Div., Ramo-Wooldridge Corp.

JOHN P. STAPP, Col. USAF - Director
Pioneer in Aeromedical and Space Medical Research. Directorate Space Bio-Medical Sciences, Air Force Missile Development Center.

KURT STEHLING - Director
Ten years rocket experience. Chief of Propulsion, Project Vanguard, Naval Research Laboratory.

WERNHER VON BRAUN - Director
Twenty four years of rocket and missile experience. Former Technical Director Peenemunde. In charge of Development of V-2. Now Technical Director, Army Ballistic Missile Agency.

S P A C E F L I G H T P R O G R A M

Report by the

Space Flight Technical Committee

of the

American Rocket Society

August 23, 1957
Revised
October 10, 1957

Approved For Release 2003/10/22 : CIA-RDP80B01676R001100030011-7

PURPOSE OF REPORT

It is the considered opinion of the American Rocket Society that rather extensive flight through space is practicable, useful, and economically feasible in the immediate future. It is the purpose of this report to propose a program and organization to derive maximum benefit from this new capability. The program should not be limited by restriction to immediate military utility, but should rather seek its justification in the necessity of keeping this nation in the forefront of those who will explore the new environment about to be entered by man. This is a long-term mission of grave national and international responsibility. The managing organization should, therefore, not be a lone association of operating activities and advisory committees such as is carrying on the present Vanguard program, but a permanent executive organization, responsible to the Congress and equipped with full authority to carry out its decisions.

Although this report is of an unclassified nature, it has been prepared by individuals having full access to all necessary information in their daily work on the nation's guided missile program. The report is rendered in full awareness of the current programs and state-of-the-art.

SUMMARY

The development of rocket propulsion and related techniques during the last twenty-five years has brought us to the point where a totally new type of transportation is attainable in the immediate future. These developments promise the ability to navigate through a new medium, the region of empty space outside our terrestrial atmosphere. This new ability, if properly exploited, may be used to achieve many unusual and far-reaching results, some forseeable, some predictable only by analogy with past experience in other spheres.

Historically, major developments in transportation have exercised a revolutionary influence upon human society. It is also historically true, although less well recognized

now, that the full importance of these developments was seldom appreciated in the beginning. Manned, powered flight was a reality for five and a half years in the land of its birth before the first military airplane was procured. Even at that date there was no clear idea of the military utility of this new vehicle.

Military application of space vehicles has fared much better to date. The first true space rocket, the German V-2, was an operational weapon, and today our highest priority goes to the development of more sophisticated space weapons, the intermediate and intercontinental ballistic missiles.

The strictly military aspects of space flight are probably receiving adequate support at the present time; however, there are many scientific , commercial, and politico-military applications of even greater long-range importance, which, in the opinion of the committee, are being neglected. These are discussed more fully in the body of this report. Indeed, there is no agency within the government which has a mission sufficiently broad to encompass a program such as is felt to be required. Existing effort is being hampered by this lack of an agency having appropriate responsibility and authority.

The recommendations of the committee are twofold: First, that a national space flight program be initiated; and second, that an agency having independent status similar to that of the Atomic Energy Commission or the National Advisory Committee for Aeronautics, be created to manage this program. Pre-requisite to the success of these measures are considered to be adequate financing, and sufficient breadth of mission to include all but strictly military applications of space-flight techniques.

It is also considered important that space-flight be considered as a new transportation technique capable of serving many purposes. As such, primary control of the new agency should be vested in persons having experience in the development of rocket vehicles, rather than with any special class of user. Potential users, however, should

be accorded an adequate voice in the formulation and execution of the program.

The impact of space-flight on the minds of men is too great to permit the challenge to be met with half hearted measures. Astronautics can no longer be considered as an appendage of the Science of Aeronautics. A unified, long-range program, consistently prosecuted and soundly managed, is the only answer that will insure our ultimate superiority.

1. FEASIBILITY AND OVERALL IMPORTANCE

1.1 Feasibility and Immediacy. Recent advances in rocket and allied technology have brought us to the point where an age-old dream of man, flight through outer space, can be realized.

Space flight, or astronautics, has as its key problem the development of rocket vehicles capable of tremendous speeds. Some thirty-six hundred miles per hour are required for a ballistic missile to travel a mere two hundred miles. At eighteen thousand miles per hour, a craft can leave the gravity field of the earth forever and travel to other celestial bodies.

Significantly, an intercontinental ballistic missile must possess a speed only ten percent less than that required to orbit. Certainly we must presume success for our ICBM program in the not-too-distant future. The implications of this program to the overall feasibility of space flight can not be over-emphasized. Although it is possible to develop other vehicles to provide the velocity required for astronautical purposes (e.g. Vanguard) the payload capabilities of the ICBM vehicles, their continued production for military purposes, and the broad base of support which they are creating form the prime basis for the assertion that we are truly on the threshhold of space. Indeed it is primarily the status of the ICBM program which gives rise to this report and the call for action now.

Using the ICBM as a booster for other smaller rockets, it is a comparatively easy

matter to put very large payloads on orbit around the earth or to send smaller rockets to or around the moon. The successful development of an intercontinental ballistic missile will bring such ventures from the realm of theoretical feasibility to that of practical immediate attainability. While still expensive in total dollars, they become economically feasible in terms of probable return.

1.2 General Scope of Recommended Program. It is considered particularly important from the point of overall economy, that space-flight development be organized for the long pull rather than on a single project basis. With Project Vanguard we have already begun a fairly expensive effort without an adequate plan or management organization. Future efforts must not be allowed to spawn haphazardly or chaos will result. A long-range integrated program would permit projects to be mutually supporting in terms both of knowledge to be gained and equipment to be developed. It would permit fullest advantage to be taken of military developments. It is for this reason that this report does not attempt to define the cost of all the foreseeable projects, but only to list the typical examples and estimate a general level of expenditure that would permit realization of significant goals on a realistic time schedule.

From a careful balancing of desirable goals, technical tasks to be performed, support from military programs, and reasonable burden to the taxpayer, it is the opinion of the Space Flight Committee that we could expect results such as the following:

(1) Orbital vehicles with payloads in the order of thousands of pounds within five years. (Scientific, communications, weather or politico-military missions.)

(2) Payloads of a hundred to several hundred pounds placed on or around the moon within five to ten years. (Scientific missions)

(3) Payloads of several hundred pounds into interplanetary space as far out as the orbits of Venus and Mars within five to ten years. (Scientific missions)

(4) Manned orbital vehicles within ten years. (This capability would include manned space flight between any two points on the earth's surface.) (Scientific, communications, weather, and politico-military missions.)

(5) Manned flight around the moon in fifteen years. (Scientific missions)

(6) Manned two-way flight to the moon - including landing within twenty years. (Scientific missions.)

The above schedule is on the assumption that no major break-throughs in the propulsion would occur. A survey of the existing state-of-the-art on which this prediction is based is contained in the appendix.

1.3 Philosophy and Purpose of the Program. Many times, especially since World War II, programs for the development of space flight and associated cost estimates have been submitted. In practically all cases the authors reached too far into the future, underestimated practical difficulties, and were overly optimistic in regard to time and cost factors. The philosophy adopted in this report is that we should: (1) concentrate on the more immediate phases (a) which have utility or indicate a real possibility for utility in the immediate future, (b) which can utilize the available state-of-the-art to the greatest possible extent, and (c) which can be realized with modest extrapolation of existing techniques; and (2) to initiate on a modest scale the research work to develop the technology that will make the long-range goals eventually attainable.

It is well recognized that space flight can not be regarded simply as an extrapolation of missile technology. Astronautics must, and will in time, develop its own "style". However, in order to do this, it must first get started. As it grows, expands, and acquires more utility, the possibilities for developing a specifically astronautical technology will improve constantly.

The most important task right now is to maintain and augment the momentum gathered by the success of high-altitude research and by the Vanguard project.

At the present time -- and probably for quite a number of years to come -- research and development facilities, skilled manpower, and available funds will be very tight, because of the demands of military missile development. Thus, unless this situation changes, it cannot be expected that a comparable capacity in these three basic ingredients of progress will be available for space flight programs. Therefore, until such change, astronautics must largely be based on missile technology. This may not correspond to the "best" approach to space flight from the engineering as well as operational point of view, but it is the only approach available, and nevertheless quite a good one. Astronautics is still so much in its infancy that its realistic goals for the present are very much like those of present missile development. This is particularly true in the field of large boosters, hypersonic gliders, space medicine, electronics, computers, instrumentation, test facilities, propellant research, nuclear propulsion research, free radical research, plasma flow and ion propulsion research, to name only some areas of activity. Even if all this would be placed tomorrow under the command of a "space czar", bent only on developing interplanetary flight, most of the present programs could be continued unchanged. In this sense, we do have a space flight development program. It is recognized that astronautics never had a greater chance to overcome the initial hurdles and materialize in the wake of non-astronautical utilities, than it has today. What, then, is the purpose of a separate space flight development program?

The immediate purpose of such a program is:

(a) To increase the dividend from the current tremendous expenditures for ballistic missiles by applying them, through judicious adaptation, to astronautical purposes.

(b) To apply the best of the state-of-the-art systematically to the development of astronautical utilities, without bias relative to source of data or equipment.

(c) To improve the state-of-the-art, in those areas not covered by existing missile requirements in order to increase space flight capabilities, and

(d) To initiate, coordinate, or support advanced research for space flight, in order to promote the development of an astronautical technology which eventually will be emancipated from missile technology and whose progress will no longer necessarily be incident to progress in missile technology.

This program thus complements military developments for the benefit of this country. It does not duplicate activities for which defense money is spent.

It is capable of furthering the prestige of the United States by putting us on the forefront in a pioneering field that has tremendous popular appeal.

It can do this at a modest cost which is far less than the benefit derived, because its effort can be skillfully compounded with the defense effort on the basis of technical performance alone without bias as regards service prestige or rivalries.

It does prepare this country's government to enter international agreements and activities pertaining to astronautics in a well-planned manner and in a leading position.

A detailed technical plan of action would be worked out by the agency responsible for the space flight program.

2. UTILITY

In considering the initiation of any program of the magnitude contemplated here the question of utility naturally arises. This utility must be established for the aggregate benefit of the country at its full price, or, when related to the individual

taxpayer, at a level comparable to his own contribution.

Benefits may be expected from the program in a number of categories. There will be increased national security as a direct result of the devices produced, and as a result of the type of industry developed and supported. There will be military and industrial benefits indirectly, as a result of the new discoveries made both in the development of the vehicles and their equipment, and in their use for scientific purposes.

For the individual, the largest direct benefit will be a sense of participation in a great adventure, and a new breadth of understanding resulting from a better understanding of the universe around him. This popular interest need reach a level comparable to a couple of cartons of cigarettes a year in order to completely justify the program regardless of other dividend.

2.1 Immediate Aspects. For the purpose of this report, the term "immediate aspects" is taken to mean a time period in which the following progams have been advanced to the state of practical accomplishments:

I Instrumental satellites for distances as far as the 24-hour orbit, for payloads up to the order of 2,000 lbs. for long operational life, with long or indefinite power supply and with recoverability (where needed).

II Cislunar and lunar instrumented probes.

III Instrumented comets for interplanetary, planetary and solar research in the region from Venusian space to Martian space.

IV Manned hypersonic gliders, capable of descent from space.

V Small inhabitable Earth satellites for 4- to perhaps 10- person capacity.

VI Manned lunar operations (circumnavigation, landing.)

Roughly, the first three programs could reach the state of practical operation in the 1958-1970 period, the last three programs in the 1970-1983 period. Thus, the term "immediate" is meant here to cover about the next 25 years.

The first three programs deal with unmanned space vehicles, exploiting the possibility of space research as far as it is possible for Earth surface based operations during this period.

The last three programs introduce manned space flight. The principal utility lies with the inhabitable satellites (they do not necessarily have to be permanently inhabited); but their use, of course, requires that personnel can get to the satellite and back. To draw the maximum benefit from the inhabitability of satellites, however, reasonably economic means of ascent and reasonably nonhazardous means of descent must be available. For this reason, it is felt that programs IV and V should aim at nuclear propulsion booster recovery, and combined thrust-brake and aerodynamic descent.

A further discussion of these programs will follow in Part III. Presently the utility of such developments will be surveyed with respect to the following areas arranged alphabetically:

1. Agriculture
2. Communication
3. Industry
4. Medicine
5. Military
6. Natural Sciences

Many of the utilities mentioned below are not novel. They are listed here to provide a complete picture as far as present anticipation of utilities is concerned.

1. Agriculture. By surveying Earth from space, long-range and short range weather prediction becomes more accurate on a continental as well as local basis. Organized, satellite-based weather service would result in great benefits to the agriculture and therewith to the economy of all nations.

2. Communications. Instrumented satellites, especially when they are at great altitude (4,000 to 8,000 miles), can serve as passive intercontinental and trans-continental communication links for radio and television transmission. Manned satellites can in addition assume surveillance of terrestrial operations in remote areas and the servicing of ships, expeditions, etc. with information and advice.

3. Industry. The environmental conditions on satellites offer four outstanding features: vacuum, extremely low temperatures and large temperature differences, intense radiation from infrared to X-rays and weightlessness. Suitable orbit position can provide a maximum of sunshine which can easily and reliably be used for high temperature processes. Conversely, behind a solar and terrestrial radiation shield, extremely low temperatures can be maintained indefinitely for the storage of liquid gases, radicals, and for maintaining processes involving superconductors. Vacuum can be used for welding or soldering; various gas atmospheres can be established in special confinements for manufacturing processes. The industrial value of satellites may lie in the production of small parts for electronic products or instrumentation, for quantity production and storage of radicals, and for other purposes; possibly even for the manufacturing of completely new products.

4. Medicine. The aforementioned environmental conditions, particular to satellites or space vehicles, may equally benefit medical sciences. One field which is frequently mentioned is, of course, space -medical and space-biological research. Yet, practical medicine may find equal benefit in many unsuspected ways. Weightlessness is normally considered a nuisance. It may, however, be of advantage in cases of heart disease, other organic disturbances, bone diseases, and perhaps for surgery in certain aspects. Low temperature conditions, existing simultaneously with weightlessness, could be found useful in some medical applications. Controlled local or overall irradiation by the Sun in space may furnish new therapies against cancer, skin diseases, etc.

Apparently, not enough thought has been given so far to the possibilities of satellite therapy snd satellite surgery to appraise its potential merits reliably.

In considering point 3 and 4, it becomes particularly apparent that these utilities depend decisively on the success of programs IV and V.

5. Politico-Military. The immediate politico-military utility is perhaps most apparent, and, by comparison, most readily realizable. It is, for the time being, also the most important utility as far as the means for actual accomplishment are concerned. The prestige value of an advanced position in space flight development has been mentioned. This factor is particularly important during periods of "cold war" where our prestige is frequently more important than force in international negotiations. The leading military powers can ill afford to neglect the potential of hyspersonic flight and satellite operations. Chemospeheric superiority implies the successful operation of hypersonic gliders for bombing and reconnaisance. Ionospheric superiority means the capability of operating satelloids and satellites for reconnaissance purposes. Finally, exospheric and free-space operations, up to altitudes of several thousand miles, are of potential politico-military usefulness, because of the increasing terrestrial area which can be kept under surveillance simultaneously. Concern with such possibilities has the added importance that it is a necessary prerequisite for out-guessing others and developing the necessary countermeasures.

In a situation where an uneasy disarmament condition exists, a space flight development program maintains a foundation in industry and technology for the rapid rebuilding of modern military power.

6. Natural Sciences. The spectacular scientific utility of instrumented Earth satellites is too well recognized to be iterated here in detail. To the geophysical, geodetical and astrophysical benefits, more advanced TV stations will add meteorological

and astronomical (observational) research possibilities unequalled on the Earth's surface.

Cislunar and lunar probes will extend research on cosmic radiation, meteoritic dust, and the geomagnetic field far out into space and will introduce selenological research as well:

(a) by non-optical measurements in the vicinity of the moon, such as search for selenomagnetic field, for aurora from a very tenuous atmosphere (if any), for emanation of corpuscular or electromagnetic radiation, due to surface radioactivity or secondary radiation from cosmic radiation, detectable only at comparatively close distance,

(b) by optical observation of the lunar surface from close distance,

(c) by impact probing to investigate the nature and condition of lunar soil.

Artificial comets extend the investigation of meteoritic matter into interplanetary space, measure the characteristics and explore the dynamics of interplanetary plasma, of the existence and stability of magnetic fields in connection with plasma jets from sun spots, for improved understanding of the transfer mechanism governing solar corpuscular radiation. The exact value (up to six digits) of one astronomical unit, of the combined Earth-Moon mass, of the moon's distance and of the Earth's orbit, are yet not known, but are of fundamental scientific and astronautical significance. The mass of Venus can be determined more accurately be measuring the perturbation of the comet in the course of a close encounter with Venus. The attenuation of various radar frequencies by the atmosphere of Venus can be used to measure the content of water in it, the form in which the water is present, and the content of solid particles (if any). Thermonuclear probes exploded in the Venusian and Martian atmosphere will determine which elements these atmospheres contain. Many more research programs can be added to this list.

2.2 Long Range Aspects. Many inventions, discoveries, or developments with a potential for broadening and enriching human life did not appear impressive or significant at all at the time of their disclosure, because in the then-existing framework of human activities they had no utility, or because there was inadequate vision to appreciate the full consequences. Most innovations have no absolute utility per se, but must be appraised in the context of the civilization by which or for which they are created. As expressions of skill, they rely on the state-of-the-art. Their utility is measured by the needs of their age. Yet, by their very existence they help advance or change human civilization. In time they become increasingly indispensable and become a source of further innovations. The explorations of Columbus were justified in prospect by a "short route" to the Indies. They were justified in the terms of the times by Inca and Aztec gold, a wholly unforeseen dividend. Today both of these short term goals are seen to be minuscule in terms of the ultimate result.

Space flight makes no exception to the general rule. It is not realistic to sit back and wait for the utility of space flight to be "proven" to everybody's satisfaction (if such were possible at all), because this can not be done without the benefit of the knowledge to be gained by space explorations. The development process has to start somewhere and an initial "down payment" must be made. Moreover, space flight in all its foreseen and unforeseen manifestations is a long development process which spans the activity of generations. Therefore, it is futile to try to ascertain utility of long-range space flight in terms of the present civilization and its needs alone.

1. Culturally and sociologically space flight encourages closer ties among nations. Just as the Earth satellite provides measurements of planetary character, not obtainable otherwise, so will space flight tend to stress the fundamentally unifying characteristics of man over the local anomalies of customs, history, and place into which he is born. When these anomalies have lost their devastating capability of arousing misunderstanding,

distrust, hatred, and even war among peoples, without, however, losing their ability to contribute to the local color and individuality of human culture, the degree of freedom and consequently the richness of human life will have been increased immeasurably. In fostering such development, space flight is likely to contribute indirectly more to material and spiritual improvements in the living standards all over this planet than any single economic or social measure. It brings this about simply by creating gradually a more intense feeling of belonging to the same planetary community which provides the necessary conditions forgreater economical security, for the profitableness of distributing wealth to increase the living standard of all and for greater effectiveness of social measures aimed at raising the dignity as well as the responsibility of man. Such improvements, in turn, will not only increase the utility of space flight in the wake of higher standards of living, but they will unlock creative forces in all facets of human civilization. These cascading consequences whose potential exceeds our imagination just as the consequences of Columbus' discovery exceeded his expectations, may well be one of the most important contributions of space flight to the future of mankind as a whole.

2. Politically, space flight can not but make still more apparent the impracticality of war as a means of solving differences between nations. Indeed, the technical and scientific standards required for successfully coping with the problems of interplanetary operations are so high that if these capabilities were applied with hostile intentions to the narrow confinements of one planet, the prospect of mutual annihilation would become even more likely than it is already. This aspect may be regarded as being of little practical importance, indicating nothing but a still higher degree of "over-killing" participants and bystanders alike, since an all-out thermonuclear war with present means already seems to spell all-round annihilation. The fact remains, however, that by no realistic standard of reasoning can space flight have any other effect but urging saner alternatives to the classical ultima ratio of international politics. In this respect the political effects of space flight will tend to support the cultural

implications outlined before.

3. The economic utility of more extended space operations is not at all obvious in specific or even more general form at the present time, (i. e., in the framework of our present civilization). However, it cannot be denied that the scientific value of such operations will be very great. Since there has been little or no scientific knowledge gained in the history of mankind, which did not develop practical utility at some later time, the same can safely be assumed to be true for space flight. Practical utilities from scientific knowledge are being developed faster in our civilization than ever before. The probability of yet unexpected economic rewards out of space flight can therefore not be discarded. This argument may appear rather vague. However, as emphasized before, this report does not attempt to urge the need for a space flight program on the basis of a possible economic utility of interplanetary operations.

The practical worthwhileness of operations on the Moon or on our neighboring planets or their moons can be decided only after the necessary facts are known. It is important to gain this knowledge so that appropriate decisions for future action can be made. The very lack of this knowledge is itself an important fact in undertaking space flight.

There is a final factor common to both short and long term aspects of space flight that is not subject to the previous type of rational justification. This is the ultimate reason of all the others --- the undoubted fact that, because of human curiosity and zest for adventure, people simply want to explore this new frontier. It is a fundamental urge as elemental as the desire for material comfort or bodily security.

Whether one looks at the long-range or at the more immediate prospects, potentials, and utilities of space flight, one finds the prospect most intriguing, the potential breath-taking, and the utilities far from imaginary. The interest of the public in the potential of space flight has grown enormously in recent years. This interest may indeed provide the momentum needed to broaden and perpetuate this country's astronautical activities far beyond the present Vanguard project.

3. PROGRAM MANAGEMENT

3.1 Recommended Organization and Mission. If it is agreed that a space flight development program looking beyond the purely military applications (i. e., ballistic missiles) is desirable, it follows that there must be an organization charged with the formulation and execution of this program. Two courses of action are possible: either the mission of some existing agency must be expanded to include astronautics, or a new agency must be created to serve the purpose.

Although certain existing agencies, notably within the armed services, have considerable competence in one or more phase of space flight technique, none contains all the capabilities necessary. Rather great augmentation of existing staffs would be required, as well as alteration of organizational structure.

While this first course of action would provide a cognizant agency, there are two inherent and it is believed fatal defects. Firstly, since there are a number of agencies of comparable qualifications (i. e., the Naval Research Laboratory, The Army Ballistic Missile Agency, the Air Force Ballistic Missile Division) selection of any one would be likely to intensify interservice friction.

A second and more important objection is that a new mission assigned to an existing agency would be required to continuously compete with the more traditional mission. Since existing organizations are staffed largely with persons having special experience and interest in the older missions, the new astronautics mission might be expected to receive only marginal support.

For these reasons, it is strongly recommended that a new independent agency, on the same level as the National Advisory Committee for Aeronautics, or the Atomic Energy Commission, be created to plan and manage the astronautics program. This agency would have space flight as its sole mission, it could be staffed and organized for this one purpose, and it would have to justify its program only to the President and the Congress.

An appropriate name would be the Astronautical Research and Development Agency (ARDA). The mission of this agency should include both the development of equipment and the conducting of exploratory space operations, unmanned as well as manned. Missions cognizance should be provided over all except strictly military projects.

If the scientific phases of the National Space Flight Program were carried out in a spirit of international cooperation, the program would have a tendency to lessen world tension while maintaining and furthering an industry and technology of vital importance in the case of national emergency.

The need for an independent organization is amply illustrated by the difficulties being encountered in managing the Vanguard satellite project through the present complicated set of advisory committees and executive agents. The extra-military nature of the program further emphasized the need for sufficient breadth of jurisdiction. It is unrealistic to believe that future, more sophisticated and complex programs, can be run successfully and economically in such a makeshift manner.

The organization should allow representation by the following agencies:

The general public

The State Department

The Central Intelligence Agency

The Department of Defense

The Department of Commerce

The Scientific Community

The mission of ARDA can be defined as follows:

The responsibility of ARDA is: To develop the science of astronautics, to establish man's capability of conducting operations in space, and to derive new benefits and utilities from such capability for the good of this nation and of all mankind. Specifically:

(a) To derive additional utility from present missile developments by applying the existing state-of-the-art to the development of astronautics and to manage those applications of space technology not wholly of a military nature.

(b) To conduct research in the Earth-Moon space as well as in interplanetary space with the purpose of advancing the natural sciences and to improve man's understanding of his cosmic environment.

(c) To search out and utilize new potential benefits from space operations or research in space, such as may pertain to agriculture, communication, transportation, medicine, or other fields of human endeavor.

(d) To improve the state-of-the-art of astronautics, as realized on the basis of missile developments, and to do advanced research for space flight, in order to promote the development of an astronautical technology and assure this country's leadership in space.

3.2 Operating Principles. ARDA would not compete with industry. It represents, basically, a management organization, and its various departments serve this purpose primarily. ARDA would operate by contract to industry, to research organizations, airlines, or steamship companies as it may become necessary in the course of establishing and maintaining ground stations, airborne stations or to organize salvaging operations. ARDA would conduct theoretical studies, maintain small research laboratories where necessary, and would evaluate scientific information gained from its activities in space. ARDA would coordinate services such as may be derived from commercial satellites, but it would subcontract the operation and -- when possible -- maintenance of such stations as soon as they operate on a routine basis. ARDA will support research and development by the Armed Services, in making the results of its own progress and new knowledge gained by such research available to them and by training personnel, or supporting tracking operations, etc., where necessary. ARDA serves the various branches of the Government, particularly the

State Department, in an advisory capacity. In the case of joint astronautic endeavors on an international basis, ARDA will be the responsible technical and scientific agency for the United States.

4. THE NEED FOR ACTION

The purpose of this report is to propose a program for space flight and a managing agency, because the Space Flight Technical Committee is fully cognizant of the urgency with which action is needed now.

The development of large and powerful missiles approaches maturity. Satellites are announced and planned by at least two countries, the United States and Russia, within a year or two.

As the door to space is opened, it becomes a generally recognized need for this country not to fall behind in the exploration of space and the development of space operations. There is, however, at present, no government agency established and officially charged with the responsibility of astronautic research and development. This country can not afford to go about this task in a haphazard, casual, and unorganized manner. As in the case of NACA, the NBS and the AEC, organizational preparations and long range planning commensurate with the magnitude of the task and the importance of the stakes involved, must be made. The time to take action is now.

Submitted to the President and the Board of Directors of the American Rocket Society, Inc. by the Space Flight Technical Committee of the ARS.

K. A. Ehricke, Chairman

APPENDIX

State-of-the-Art -- 1957 Although the general state-of-the-art is apparent from the progress of the missile (particularly the ICBM) program, it is useful to examine this subject in greater detail. This will be done according to the following categories:

1. Propulsion
2. Structure
3. Guidance
4. Re-Entry
5. Instrumentation
6. Power Supply
7. Ground Test Facilities
8. Launching Sites
9. Tracking and Communication
10. Supporting Industry and Research
11. Advanced Research
12. Space Biology
13. Systems Development Management
14. National and International Law

It is obvious that, in an unclssified report such as this, only a general survey can be offered here, based on published facts. However, we believe that these facts offer strong evidence for the readiness of our nation to deal seriously with the problem of a coordinated space flight development program and to establish the necessary means for exerting a consistent effort in formulating, managing, and realizing such a program.

1. Propulsion The transition from water-diluted alcohol to hydrocarbon fuels used with oxygen has been successfully completed during the past decade. At the same time, the combustion chamber pressure has been doubled and tripled, compared to World War II rocket motors, and great improvements in propellant injection and mixing have been made. These

advances have resulted in an increase in standard specific impulse by 20 to 30 percent over standard values at the end of World War II. Engines for very large thrust, in excess of 100,000 lb., have been developed and are tested on a routine basis. The problem of operating a multi-engine propulsion system has also been worked out, such as in the experimental rocket airplanes and in more advanced missiles. New, more potent fuels and oxidizers are presently under investigation and are tested in rocket engines. High performance turbopumps and feeding systems exist for large rocket motors. Liquid propellant rocket engines of still higher specific impulse will emerge from present research and development for practical use within the next four to seven years. The Vanguard satellite vehicle is using typical high-performance liquid propellants, developed in the recent past, in its first two stages, namely, liquid oxygen-hydrocarbon and white fuming nitric acid-dimethylhydrazine. In the field of solid propellants great strides have been made regarding the performance and size of solid propellant motors. The general field of solid propellants has experienced an enormous growth during the recent years through the introduction of single and double base and colloidal systems. A wide choice of high performance systems is therefore available to the present engine designer and systems engineer.

2. Structure. In addition to large missile structures in general, specific multi-stage structures have been announced. For example, the Vanguard vehicle is a 4-stage system, three stages being powered, the fourth being the satellite. In September, 1956, a 3-stage Redstone assembly, using the Redstone missile as first stage, was successfully fired over a distance of 3,000 miles. As second stage, a cluster of parallel solid propellants was used, and as third stage, a single solid propellant rocket. The X-17, a USAF re-entry research vehicle, is another example of the use of 3-stage systems, the second stage consisting of a cluster of three parallel rockets. NACA-PARD has fired 4-stage aerodynamic research rockets. The structural features of the Atlas and Titan missiles have not been announced, but they certainly must represent solutions to the problems involved in creating very light multi-staged vehicles.

3. Guidance. The development of guidance systems for long-range ballistic missiles has to satisfy accuracy requirements believed impractical at the end of World War II. Simple flight mechanical considerations show that, for a range of 6,000 miles, the penalty for 1ft/sec error in cut-off velocity (out of 23,000 ft/sec) is about one mile. Such accuracy, which seems to be of the order required for successful ballistic missiles, is greater than would be required for most other space missions. For launching a satellite into an approximately circular orbit, a cut-off velocity error of about ± 10 ft/sec (out of about 25,000 ft/sec) is permissible. In fact, the Vanguard tolerance is considerably higher. At lunar distance a cut-off velocity error of 1 ft/sec (out of 35,000 ft/sec) causes an apogee displacement of the unperturbed ellipse of about 500 n. mi. For a simple lunar circumnavigation, such an error would not be critical, unless the minimum distance is selected to be very close to the Moon. Actually, the focusing effect of the lunar gravitational field relaxes the accuracy requirements to some ± 10 ft/sec or more, depending upon the mission.

4. Re-Entry. Here again, the ICBM program paves the way for future astronautical experiments. The USAF test missile X-17 is specifically developed to prove experimental data for ICBM nosecones. An ICBM would re-enter the atmosphere at only slightly less speed than a returning space ship. Ground test inatallations, such as the shock tubes at AVCO, AEDC, and the ultra-high speed test facilities at NACA-Ames Laboratories work toward the solution of the re-entry problem for long-range guided missiles. The problems involved in satellite recovery are simpler, in some respects, than the nosecone re-entry problems of ICBMs.

5. Instrumentation. The state-of-the-art of small, low-weight precision instrumentation has been advanced greatly in a decade of high-altitude research with rockets, and is presently brought to a peak in the course of the sub-miniaturization of the Vanguard satellite instrumentation. The Vanguard equipment weight of ten pounds includes power supply

and transmitter. The instrumentation weight is therefore less than ten pounds and includes photocell and circuitry for Lyman alpha radiation measurements, a proton-precession magnetometer, an instrument package for cosmic ray experiments, a miniature magnetic tape recorder for cosmic ray and terrestrial energy balance experiments, four bolometers for energy balance measurements and a resistance strip erosion gage for micrometeorite erosion measurements.

With payloads of the order of four to six pounds, magnetic field measurements, cosmic ray experiments, and micrometeorite impact investigations can be made,(and the results transmitted to Earth) from great distances in cislunar space, as far out as 10,000 n. mi. and beyond. A payload of 45 pounds is considered adequate today for most near-future scientific space experiments in terrestrial and cislunar space. Such weights compare favorably with the many thousand pounds of long-range missile warheads. By reducing the nose weight to such an extent, the flight performance is greatly increased.

6. Auxiliary Power Supply. The state-of-the-art in storage battery auxiliary power supply is sufficiently advanced to permit the operation of battery-powered satellites which carry a considerably greater payload than Vanguard (approximately 28 watt-hours per pound of battery weight for activated battery types). However, as the payload become more sophisticated, possibly also involving TV transmission, batteries are not suitable because of the complex number of voltages required. Alternate possibilities such as the fuel cell battery, the solar battery, and the nuclear reactor battery are presently under development. Among these, the fuel cell battery and the nuclear reactor battery can yield high wattage. In less than a decade from now the space vehicle designer will be able to select among a variety of auxiliary power devices to satisfy special requirements regarding voltages, space, weight, duration and intensity of power drainage.

7. Ground Test Facilities. A great number of Armed Forces and private industry test facilities are available for ground testing missiles of almost any practical size. Component test facilities, particularly engine test facilities, are numerous in private industry with provisions for testing engines to about a million pounds of thrust.

8. Launching Sites. A well equipped research and development launching site has been established in recent years by the USAF in Florida (AFMTC). This site is capable of handling all large missiles presently under development as well as the Vanguard missile. It can be expected that AFMTC will be the model for additional launching sites in the near future.

9. Tracking and Communication. Tracking of space vehicles can be done optically and with lesser accuracy by radio. For the optical tracking of low-altitude satellites the customary long focal length astronomical telescopes of high precision can not be used, because of the rapid angular motion of the object. Therefore, special equipment of short focal length has been developed for the purpose of tracking Vanguard and other satellites (Baker-Super-Schmidt). For photographic tracking it is important to note that very high speed photographic emulsions and developers for greatly improved sensitivity, compared to a few years ago, are available. Still faster speeds (about 50 times those of fast emulsions) are available for photoelectric tracking by means of the image converter and image-tube techniques. Although this latter method is less well developed at this time (lower accuracy in determining the object's position) it holds great promise which makes further developments not only possible but quite attractive. It is hoped that optical tracking accuracies with short focal length instruments of the order of one second of arc can be achieved eventually. This would correspond to 5.12 ft. at 200 miles or 6,144 ft.(almost exactly 1 nautical mile) at lunar distance (240,000 miles). In the latter case, however, astronomical long focal length telescopes could be employed, capable of increasing the tracking accuracy to 0.1 - 0.01 n. mi. at lunar distance.

For radio tracking radar and a very accurate phase-comparison technique, based on the interferometer principle, has been developed. The radio tracking has the advantage of being independent of overcast. Thus, through Vanguard, as well as on account of the developments in long-range guided missile tracking, a state-of-the-art has been reached in tracking and communication (telemetering) which is potentially adequate for operations in the entire Earth-Moon system.

10. Supporting Industry and Research. It should summarily be noted here that a tremendous industrial background is available, not only in the form of big companies with a wide variety of research laboratories and test facilities, but equally important, in the form of a large number of smaller enterprises. Industrial companies specialize in liquid or solid rocket engine development, in the development of guidance systems, air frames, power supply, development and production of new propellants and of new materials for a great range of temperatures from storage of liquid gases to resistamce to extreme temperatures. Most important, however, is the scientific approach to engineering development, which has become customary, and the build-up of large, well-managed teams of scientists and engineers. In this form, industry, research, and the corresponding government facilities can solve any problem of space flight which will be encountered during the coming years. By integrating apparently remote industrial fields, such as, for example, the fabrication of large balloons, new and important contributions to space flight become possible. Small high-altitude rockets have been fired from balloons and the firing of satellite rockets and even lunar rockets from balloons has been suggested. Of great importance is the use of balloons in high-altitude biological research. Balloons as carriers of stratospheric observatories may eventually enable accurate optical tracking of space vehicles independent of weather conditions.

Supporting research is conducted in the field of materials, electronic equipment, reliability of equipment, in wind tunnels, solar furnaces, electronic arc tunnels, rarefied gas flow faoilities, the development of leight-weight, high intensity light sources, special electronic computers, miniaturized television equipment, free radicals, receiver signal/noise ratio improvement, attenuation measurements in flames, electronic packaging, improved measuring techniques, miniaturized instrumentation, and a host of other activities. Never before in the history of mankind has research in fields potentially contributing to the progress in astronautics been so vigorous and all-embracing as at this time.

11. Advanced Research. In addition to support research, advanced research is in progress directly aimed at increasing our potential capability to conduct space flight. Outstanding examples are the research in the field of nuclear propulsion for rockets, and contracts let by the Air Force (OSR) in the field of plasma flow and ion propulsion systems, as well as Army research in advanced propellants, guidance, and tracking.

12. Space Biology. For several years biological and medical research in connection with high altitude and space flight has been underway, by the Air Force and the Navy. Details of this research and its effect on the development of pressure suits, bail-out equipment, are wellknown and will not be repeated here. Highlights of this work, from the viewpoint of astronautics, are the high "g" load research, the experiments in weightlessness, the establishment of temperature, pressure, humidity, and oxygen deficiency limitations, the effects of sudden decompression, of vibration, and of radiation, animal tests with high altitude rockets and balloons, and Project Man-High, involving experiments with humans at altitudes above 100,000 ft for a 24-hour period.

13. Systems Development Management. The development of large missile systems, in this country or elsewhere, will always require close cooperation and management teamwork among agencies of the Department of Defense, the Armed Forces, or other branches of the Government, industry, and science. Projects like the Vanguard missile or the ICBM, involve countrywide cooperation of organizations under the management of a military-scientific engineering team, organized loosely after the model of the Manhattan project. However, their goal is always quite specific and of comparatively immediate nature, compared to the long-range aspects of an overall astronautics programs. A special Scientific Advisory Committee assists the Secretary of Defense and provides technical advice and counsel to all three services.

14. National and International Law. There is precedent for considering the space above the sensible atmosphere as the domain of no one nation. Both the U.S. and the USSR have announced their intention to fly scientific satellites. These announcements have been received without protest from nations to be overflown. The outlook for "freedom of space" on a par with "freedom of the seas" is good. Establishment of this condition in international law is a prerequisite to any national space flight program.

CONFIDENTIAL

26 November 1957

MEMORANDUM FOR: Director of Central Intelligence

SUBJECT : Space Travel and Reconnaissance Satellites

REFERENCES : A. Waterman's Letter Regarding Organization of U.S. Space Travel Research Program, dated 19 November 1957

B. Dr. Scoville's Memorandum Regarding Space Travel and Reconnaissance Satellites, dated 25 November 1957

1. This memorandum will serve as my brief comment on Reference A, of which you sent me a copy, and also my reaction to Dr. Scoville's views in Reference B.

2. I have only the most superficial knowledge of the way in which research and development projects are handled in the Pentagon, and I have not had an opportunity to discuss the subject of Mr. Waterman's letter with others better informed than myself. Nevertheless, my first reaction is a rather strong dissent from Dr. Scoville's view and strong agreement with Mr. Waterman's view. Reading between the lines of Dr. Scoville's argument, he seems to me to be making two points on which I will comment.

3. First, he seems to me to be saying in rather general terms that any large, highly technical, research and development project stands a considerable chance of failure if it is undertaken anywhere in the Government except in the military establishment. He refers specifically to the trouble encountered by the Vanguard Program, in part by reason of its separation from military programs. I am not convinced however that even large and costly programs cannot be handled outside the military establishment if they are given the funds and the priority. The oft-quoted Manhattan

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Project was done in just this fashion. Moreover, I think it is high time that we did develop in this Government organizations outside of the Department of Defense capable of doing jobs of this sort.

4. Second, he makes the entirely valid point that any development looking toward manned satellites or space ships would use military rockets and will certainly have to call on the know-how derived from military missile development. Granted the truth of this proposition, I question whether it follows that a program involving a quite different application of rockets and rocket components originally developed for military use has to be under military control. There is after all an intimate relationship between military development in aviation and resulting advances in commercial technology. There will in any event have to be separate programs for the proposed non-military applications, and these will have to make use of and have access to components originally developed in the military missile programs. I see no reason why the separate programs should not be in a different Department of the Government.

5. The above are essentially rebuttal points. The affirmative arguments in favor of non-military control seem to me clear. I think it highly undesirable to put a military label on every major technical development sponsored by the United States Government. Moreover, if we can once break the pattern, I see no reason to believe that development work cannot be organized better outside of the Pentagon than inside. Most of the real work is done in the universities, the research organizations, and the industrial corporations anyhow. The key to the success of a civilian-managed effort, I feel, is the necessary priority and the funds.

6. I have concurred in the draft letters of reply prepared for your signature, since these are only acknowledgments. I will discuss this matter further with Dr. Scoville and with others in order to see if they and I can present you with any less strongly disagreed opinions.

[redacted] 25X1

Special Assistant to the Director
for Planning

Attachments: As Stated

cc: AD/SI

MEMORANDUM FOR: Director of Central Intelligence

SUBJECT: Space Travel and Reconnaissance Satellites

REFERENCES: 1. Waterman's Letter Regarding Organization of US Space Travel Research Program dated 19 November 1957.

2. American Rocket Society Letter dated 12 November 1957, subject, "Space Flight Program"

1. This memorandum suggests action on the part of the DCI. Such requested action is contained in paragraph 3.

2. The subject of the US program for development of satellites for reconnaissance purposes and for space travel has been recently given increased attention both within and without the government. The Science Advisory Committee at its meeting on 22 November considered the importance of research in these fields. While initially some of the members were skeptical and felt that it was being over-played, I believe that by the end of the discussion most agreed that this was a tremendous new field of research. It was further agreed that the satellite or space ship should only be considered of interest as a vehicle or platform upon which to carry out experiments of fundamental scientific interest or for operations of military and intelligence significance. I believe Killian has organized a panel to consider programs in these fields.

3. The two referenced letters propose special organizations outside the Defense Department for the conduct of research in these fields. Undoubtedly the organization for such work will be given considerable thought in the near future and this agency has an important interest in the decisions that are reached. However, the problem is very complex and I believe caution should be exercised in committing yourself to any proposal until the proposals are clearer. I believe that Mr. Bissell is probably in the best position to establish the Agency views. In the meantime, I believe you should answer the enclosed letters cautiously expressing interest but not committing yourself. Proposed draft replies are enclosed.

4. I personally feel that this program really belongs in the Defense Department since the largest cost of work in this field will be in developing and using missiles to get the satellites in orbit or the space ship into outer space. If the research was conducted by a group outside the

Defense Department, then they would always have to come begging to the Defense Department for funds and support and this is not likely to be too easily forthcoming when this will be competing with military services. On the other hand, I do hate to see the research in this field bog down in the morass of the present military research programs. If the newly reinforced position of Assistant to the Secretary of Defense for Missiles and Satellites really has some teeth and can make some decisions which stick, then some of the present difficulties might disappear. I do not believe that the arguments voiced by Dr. Waterman strongly support his views that the responsibility should be outside the Defense Department. I do not believe he has learned the lesson from the failures in the VANGUARD Program.

25X1 [redacted]

/HERBERT SCOVILLE, JR.
Assistant Director
Scientific Intelligence

Enclosures:
1. Proposed Reply to American Rocket Society w/incoming letter

2. Proposed Reply to Alan Waterman w/incoming letter

cc: DDCI
DD/I
SA/Planning/DCI

9-7646

NATIONAL SCIENCE FOUNDATION
OFFICE OF THE DIRECTOR
WASHINGTON 25, D. C.

November 19, 1957

CONFIDENTIAL

CONFIDENTIAL

The Honorable Allen W. Dulles
Director, Central Intelligence Agency
Washington 25, D. C.

Dear Allen:

By the enclosed copy of my letter to Secretary McElroy, I am bringing to your attention a matter which seems to me of very considerable importance and immediacy. It is abundantly clear that the country is anxiously awaiting word as to the intentions or plans of the Government to proceed with a program in the exploration of space.

Apart from the point of view I have taken in this letter to Mr. McElroy, I believe it is most important and urgent that this question receive prompt consideration by the interested agencies of Government. This includes at least the Department of State the Department of Defense, the Central Intelligence Agency and the National Science Foundation.

This matter has been discussed in a preliminary way with Dr. James R. Killian, Jr.

Sincerely yours,

Alan T. Waterman
Director

Enclosure

(Unclassified upon removal of enclosure)

ER

EXECUTIVE REGISTRY FILE National Science Foundation

NATIONAL SCIENCE FOUNDATION
OFFICE OF THE DIRECTOR
WASHINGTON 25, D. C.

November 15, 1957

CONFIDENTIAL

CONFIDENTIAL

The Honorable Neil H. McElroy
Secretary of Defense
Washington 25, D. C.

Dear Mr. McElroy:

I am taking this occasion to write you concerning future plans for a United States satellite effort--this matter of obvious present urgency. Insofar as such effort may take the form of a scientific undertaking, the National Science Foundation and its National Science Board are involved by responsibilities assigned in the National Science Foundation Act of 1950 and Executive Order 10521 of 1954.

We are pleased with your announcement that the Army will go forward with its project to back up Project Vanguard. It is my understanding that the Army project is intended to supplement Vanguard as an undertaking for the International Geophysical Year. In this connection, of course, it is clear that careful coördination should exist both between the two projects and with the United States National Committee for the International Geophysical Year (under the National Academy of Sciences-National Research Council) which has cognizance of the scientific programs of the International Geophysical Year, including the satellite project in the latter, subject of course to limitations of payload and feasibility set by the Department of Defense.

With regard to the future of the U. S. plans regarding space exploration, looked at objectively there seem to be only three possibilities as follows:

A. Stop the U. S. program after the International Geophysical Year

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B. Consider possible international (or Free World) collaboration.

C. A determined program to match Russia's challenge.

Possibility A. seems completely out of the question; this is not a field we can now ignore in view of the opinion of our own country and of the world. Possibility B. would be very difficult of execution, even if we should like to do so, especially since we would be leading from weakness. Its only asset might be a movement toward peaceful cooperation somewhat like the Atoms for Peace plan.

It seems to me that we have no alternative but plan C. (a halfhearted effort will not do). In that case, there is certainly no question that a really determined effort must be made on the highest priority basis. This will be very expensive and unfortunately will necessarily draw skilled manpower to some extent from the military programs, even if only part-time. However, it is quite likely that we have on tap manpower resources which can be turned to this purpose and also likely that such an independent effort along these lines may provide fresh ideas which could be useful to the military.

Such an effort unquestionably requires a special organization, with a strong director. I believe there are strong reasons for setting up such an organization outside the Department of Defense. This is no reflection upon the competence of the Department of Defense, either in this area or in accomplishment of high priority programs. The primary reason is that in view of the Russian approach, which emphasizes science and space travel, there will be a very unfavorable attitude throughout the world if the U. S. program were known to be associated with the military. (The Russians can do this and keep it quiet; we cannot) Besides, it is of great importance that this be known to be a civilian scientific undertaking, in order to have the enthusiastic and wholehearted cooperation of scientists and the public generally.

The Honorable Neil H. McElroy November 15, 1957

This is one program which, in my opinion, warrants a Manhattan project type of organization. An effective set-up requires careful consideration, but the central idea should be the establishment of a center financed by the Government by contract with a civilian agency, in order to provide sufficient flexibility. Such an organization should have the full cooperation of the Department of Defense. It should also have authority to conduct or subcontract such research and engineering as needed. Possible goals can readily be outlined and should have to be considered with care. The announced purpose should be scientific exploration of the earth's environment and outer space.

Such a set-up would also have the advantage of serving to deflect attention from Defense projects of similar or related character but with military goals and also to protect security classification aspects of the latter.

Interested agencies which could unite in its support would be the National Science Foundation, the National Academy of Sciences-National Research Council, and the American Rocket Society, together with scientific societies such as the American Geophysical Union and others with particular related interest.

I should be happy to discuss this matter with you at your convenience as would Dr. Bronk, President of the National Academy of Sciences.

Sincerely yours,

Alan T. Waterman
Director

DD/S 57-996-A
ER 9-1882/a

5 April 1957

Dr. Alan T. Waterman
Director, National Science
Foundation
Washington 25, D. C.

Dear Alan:

I have reviewed with interest the proposal of the Office of Defense Mobilization that the National Science Foundation extend its registration activities to include area and language specialists. The ability to identify such specialists is a matter of great importance to the Government. However, this involves certain considerations which I should like to discuss with you personally.

Your thoughtfulness in referring this matter to me is sincerely appreciated and in the event you decide to proceed with this project we may be able to assist your office in drawing up procedures relative to self-evaluation of language skills. Mr. Gordon Stewart, Director of Personnel, will be available to you for further consultation.

Sincerely,

STAT DD/Pers/[redacted] 2 Apr 57
Retyped: EA-DD/S:CEB:dlc (2 Apr 57)
" O/DCI:AWD:ekt (5 Apr 57)
0&1 - addressee
1 - ER
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1 - DTR
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1 - DD/S reading

SIGNED

Allen W. Dulles
Director

CONCUR s/kKWhite (DD/S)
3 Apr 57

DD/S 57-996-A

Dr. Alan T. Waterman
Director, National Science
Foundation
Washington 25, D. C.

Dear Alan:

I have reviewed with interest the proposal of the Office of Defense Mobilization that the National Science Foundation extend its registration activities to include area and language specialists. The identification of such specialists is a matter of great importance to the Government; however, rather than enter into a joint undertaking, I believe this Agency should concentrate on drawing up a select list of such specialists to meet its particular needs.

I appreciate very much your thoughtfulness in referring this matter to me. In the event you decide to proceed with this project, we may be able to assist your office in drawing up procedures relative to self-evaluation of language skills. Mr. Gordon Stewart, Director of Personnel, will be available to you for further consultation.

Sincerely,

Allen W. Dulles
Director

STAT

CONCUR:

Deputy Director
(Support)

STAT

DD/Pers/[redacted] (2 Apr 57)
Re-typed:EA-DD/S:CEB:dlc (2 Apr 57)
Distribution:
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1-DD/PERS/PD w/basic
1-DD/S chrono
1-DD/S reading

CENTRAL INTELLIGENCE AGENCY

WASHINGTON 25, D. C.

OFFICE OF THE DIRECTOR

Dr. Alan T. Waterman
Director, National Science
Foundation
Washington 25, D. C.

Dear Alan:

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Sincerely,

Allen W. Dulles
Director

NATIONAL SCIENCE FOUNDATION
WASHINGTON 25, D. C.

The attached publication, Organization of the Federal Government for Scientific Activities, has recently been issued by the National Science Foundation. The report is one of a series which the Foundation has been preparing in order to set forth basic information on scientific activities throughout the Nation.

The report covers the Executive departments and agencies which are engaged in scientific activities. For the purpose of this report, scientific activities includes, in addition to the conduct and support of research, the training of scientific manpower, the dissemination of scientific information, testing and standardization and other related activities. The report describes the organization for science in each of these departments and agencies and their principal subdivisions, and summarizes the nature of the scientific activities engaged in. An introductory section briefly reviews the history of Federal organization for science with special attention to developments since 1947.

It is hoped that the report will be of interest to you. Additional copies may be obtained from the National Science Foundation or the Government Printing Office.

James M. Mitchell

James M. Mitchell
Associate Director

Attachment:
1cc - OD/P
1 - OD/S
3 - OD/L

Nat'l Science Found.

MEMORANDUM FOR: THE DIRECTOR

The attached proposed letter to Dr. Alan T. Waterman, Director, National Science Foundation, is in response to his 21 March 1957 request that you comment on the Office of Defense Mobilization's proposal that the National Science Foundation include area and language specialists in its Register of Scientific and Technical Personnel.

There is considerable doubt if the inclusion of area and language specialists in the Register would be of benefit to CIA. Furthermore, security considerations would preclude the listing of Agency area and language specialists.

STAT

Recommend signature.

APR 3 1957
(DATE)

L. K. WHITE
Deputy Director (Support)

FORM NO. 101 REPLACES FORM 10-101
1 AUG 54 WHICH MAY BE USED. (47)

SENDER WILL CHECK CLASSIFICATION TOP AND BOTTOM

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CENTRAL INTELLIGENCE AGENCY

OFFICIAL ROUTING SLIP

TO	NAME AND ADDRESS	INITIALS	DATE
1	DR. SCOVILLE		
2	145 Barton Hall		
3			
4			
5			
6			

	ACTION		DIRECT REPLY		PREPARE REPLY
	APPROVAL		DISPATCH		RECOMMENDATION
	COMMENT		FILE		RETURN
	CONCURRENCE		INFORMATION		SIGNATURE

Remarks:

The attached was handed to the Director by Alan T. Waterman at today's meeting of the Science Advisory Committee. The boss would like your comments.

FOLD HERE TO RETURN TO SENDER

FROM: NAME, ADDRESS AND PHONE NO.	DATE
[redacted]	10 Dec 57

UNCLASSIFIED | CONFIDENTIAL | SECRET

25X1

FORM NO. 237 Replaces Form 30-4 which may be used. (40)

1 APR 55

U. S. GOVERNMENT PRINTING OFFICE : 1955 -O-342531